

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/IB2005/001771

## A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl. <sup>7</sup>: C 12 N 005/02, C 12 N 015/29

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
 MEDLINE, CAPLUS, WPIDS, AGRICOLA, BIOSIS, BIOTECHABS (arabinogalactan?, arabinosylat?, embryo?, Yariv precipitable material, hydroxyproline rich glycoprotein); DGENE, Genbank (SEQ ID NO: 17-20, 25, 26)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	Poon, S. et al. 'Somatic Embryogenesis-specific Arabinogalactan-proteins in Cotton Cell Cultures. In: In Vitro Cellular and Developmental Biology Animal, (Spring, 2002), Vol. 38, Abstract, pp134.A. 10 <sup>th</sup> IAPTC&B Congress Posters, ref #P-1450. See whole document.	1-5, 12-17, 30
X	van Hengel, A.J. et al. A Relationship Between Seed Development, Arabinogalactan-proteins (APGs) and the AGP Mediated Promotion of Somatic Embryogenesis. Physiologia Plantarum. 2002, Vol. 114, pages 637-644. In particular p638, column 1, paragraph 3 to p639, column 1, paragraph 1; p642, column 1, paragraph 1 to column 2, paragraph 2; Table 1.	1-5, 12-17, 30
X	von Arnold et al. Developmental Pathways of Somatic Embryogenesis. Plant Cell, Tissue and Organ Culture. 2002, Vol. 69, pages 233-249. In particular p242.	1-5, 12-17, 30

☒ Further documents are listed in the continuation of Box C☐ See patent family annex

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier application or patent but published on or after the international filing date	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search  
 6 September 2005

Date of mailing of the international search report  
 15 SEP 2005

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	van Hengel, A.J. et al. <i>N</i> -Acetylglucosamine and Glucosamine-Containing Arabinogalactan Proteins Control Somatic Embryogenesis. <i>Plant Physiology</i> . 2001, Vol. 125, pages 1880-1890. In particular p1883, column 2, paragraph 3 to p1884, column 2, paragraph 1; Tables I and II; p1888, column 1, paragraph 3; p1888, column 2, last paragraph to p1889, column 1, paragraph 1.	1-5, 12-17, 30
X	Showalter A.M. Arabinogalactan-proteins: Structure, Expression and Function. <i>Cellular and Molecular Life Sciences</i> . 2001, Vol. 58, pages 1399-1417 In particular p1410, column 1, paragraph 2; p1411, column 2, paragraph 2.	1-5, 12-17, 30
X	Kreuger M. et al. 'Chapter 10: Effect of Arabinogalactan-Proteins and Chitinases on Somatic Embryogenesis' In: <i>Cell and Developmental Biology of Arabinogalactan-Proteins, Proceedings of the Symposium in Plant Physiology</i> . (2000) Edited by Nothnagel et al. pages 109-119. See whole document.	1-5, 12-17, 30
X	Pereira-Netto A.B. et al. 'Changes on the Differentiation Pattern of Carrot Cells Induced by a Sulphated Alpha-D-glucan and an Arabinogalactan' IN: <i>Plant Biology</i> . 1998, Vol. 1998, page 129. (Annual Meeting of the American Society of Plant Physiologists, Abstract #601). See whole document.	1-5, 12-17, 30
X	Toonan M.A.J. et al. Promotive and Inhibitory Effects of Diverse Arabiongalactan Proteins on <i>Daucus carota</i> L. Somatic Embryogenesis. <i>Planta</i> . 1997, Vol. 203, pages 188-195. In particular p189, column 2, paragraphs 3 to 4; p190, column 1, paragraph 2 to p194, column 1, paragraph 1; Figures 1 to 3; Tables 1 to 3.	1-5, 12-17, 30
X	Kreuger M. and van Holst G.-J. Arabinogalactan-protein Epitopes in Somatic Embryogenesis of <i>Daucus carota</i> L. <i>Planta</i> . 1995, Vol. 197, pages 134-141. In particular p136, column 1, paragraphs 1 to 2 and paragraph 6; p136 column 2 paragraph 3 to 6.	1-5, 12-17, 30
X	Kreuger M. et al. Somatic Embryogenesis of <i>Cyclamen persicum</i> in Liquid Medium. <i>Physiologia Plantarum</i> . 1995, Vol. 94, pages 605-612. In particular p606, column 2, last paragraph to p607, column 1, paragraph 3; p609, column 1, last paragraph to p610, column 1, paragraph 1; Figure 5.	1-5, 12-17, 30
X	Egertsdotter U. and von Arnold S. Importance of Arabinogalactan Proteins for the Development of Somatic Embryos of Norway spruce ( <i>Picea abies</i> ). <i>Physiologia Plantarum</i> . 1995, Vol. 93, pages 334-345. In particular p336, column 1, paragraph 5 to column 2, paragraph 3; p337, column 1, paragraph 2 to column 2, paragraph 3; p338, column 2, paragraph 2 to p341, column 1, paragraph 1; Table 3.	1-5, 12-17, 30
X	Kreuger M. and van Holst G.-J. Arabinogalactan Proteins are Essential in Somatic Embryogenesis of <i>Daucaus carota</i> L. <i>Planta</i> . 1993, Vol. 189, pages 243-248. In particular p244, column 1, paragraph 3; p244, column 1, last paragraph to column 2, paragraph 1; p246, column 2, last paragraph.	1-5, 12-17, 30

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C (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P, X	Poon et al. 'Improving the Efficiency of Embryogenesis in Elite Cotton Cultivars' IN: 11 <sup>th</sup> Australian Cotton Conference Proceedings. 10 <sup>th</sup> -12 <sup>th</sup> August 2004. Organised by the Australian Cotton Growers Research Association Inc. (ACGRA). See whole document.	1-35
A	Pereira-Netto A.B. et al. 'Inhibitory Effects of an Arabinogalactan on the Somatic Embryogenesis of Carrot ( <i>Daucus carota</i> L.) cells IN: Plant Biology. 1999, Vol. 1999, page 151. (Annual Meeting of the American Society of Plant Physiologists 1999, Abstract #601). See whole document.	1-35
A	Thompson H.J.M and Knox P.J. Stage-specific Response of Embryogenic Carrot Cell Suspension Cultures to Arabinogalactan Protein-Binding $\beta$ -glucosyl Yariv Reagent. Planta. 1998, Vol. 205, pages 32-38. See whole document.	1-35

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**Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)**

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)

**Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)**

This International Searching Authority found multiple inventions in this international application, as follows:

See supplemental sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☒ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

**Supplemental Box**

(To be used when the space in any of Boxes I to VIII is not sufficient)

**Continuation of Box No: Box III**

The international application does not comply with the requirements of unity of invention because it does not relate to one invention or to a group of inventions so linked as to form a single general inventive concept. Note that Rule 13.2 states that where a group of inventions is claimed in one and the same international application, the requirement of unity of invention referred to in Rule 13.1 shall be fulfilled only where there is a technical relationship among those inventions involving one or more of the same corresponding special technical features. The expression "special technical features" shall mean those technical features that define a contribution which each of the claimed inventions, considered as a whole, makes over the prior art.

The ISA has identified two (2) separate inventions:

1. Methods for fostering somatic embryogenic competence by contacting tissue with particular Arabinogalactan protein (AGP) compositions. (Claims 1 to 22).
2. Compositions that foster somatic embryogenic competence limited to a hydrophobic fraction of embryogenic cotton AGP, particular proteins, AGPs treated in a particular manner or from a particular source. (Claims 23 to 35).

The feature that is common to the 2 inventions is AGPs that foster embryogenesis. This feature is not novel and not inventive and therefore does not represent a special technical feature. The feature is disclosed in a number of documents. See for example:

- van Hengel, A.J. et al. A Relationship Between Seed Development, Arabinogalactan-proteins (AGPs) and the AGP-mediated Promotion of Somatic Embryogenesis. *Physiologia Plantarum*. 2002, Vol 114, pages 637-644.
- Egertsdotter U. and von Arnold S. Importance of Arabinogalactan Proteins for the Development of Somatic Embryos of Norway Spruce (*Picea abies*). *Physiologia Plantarum*. 1995, Vol 93, pages 334-345.

Therefore the claims do not relate to one invention only and lack unity *a posteriori*.

The ISA has searched all searchable claims (claims 1 to 35) without effort justifying an additional fee and accordingly the ISA did not invite the payment of any additional fee. Consequently the ISR encompasses all the claims.